



Additive is competitive

Materials & Applications Handbook

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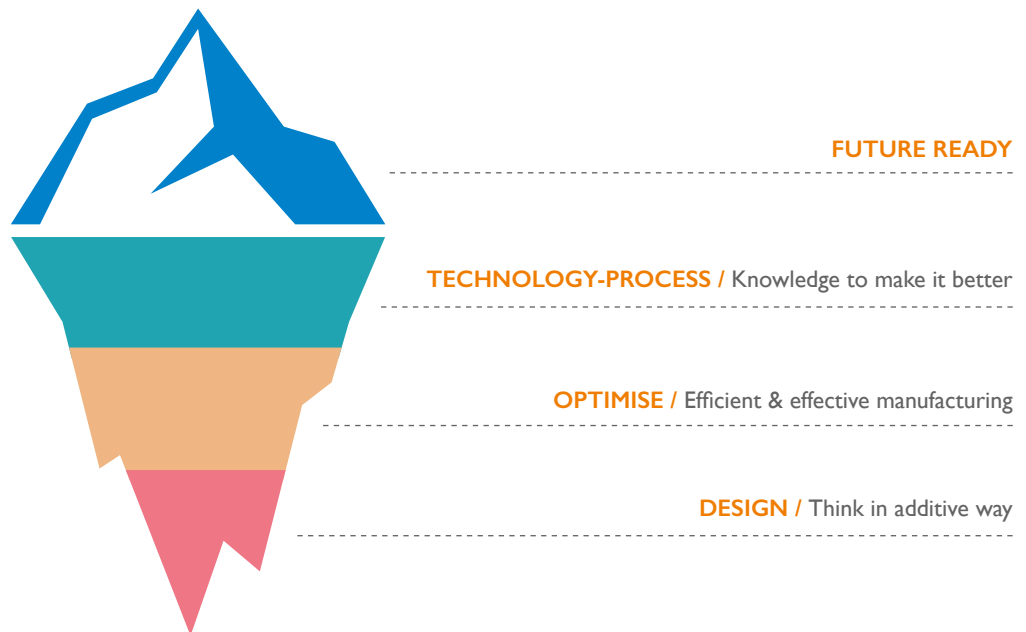
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ADDITIVE
MATERIALS

Next level. Next to you.

The rapidly evolving field of **Additive Manufacturing** has still only touched the tip of the iceberg in terms of maturity, with significant progress still to be made in all areas, not limited to development of design, software, processes, materials, equipment and services.

In line with the **Prima Industrie philosophy**, **Prima Additive is next to you as your partner offering a unique, full turnkey solution through this journey.** Supporting you in all areas of additive powder bed fusion and laser metal deposition from design and application support through to provision of equipment with our long established global service network. Our team of experts will always be available to listen, collaborate, assist and advise you.



What can be found in this brochure

A comprehensive selection of **Prima Additive Materials for Powder Bed Technology** for 3D printing components.

A straight path to the heart of Prima Additive, presenting **applications and manufacturing capacity.**

An **introduction** to our philosophy to discover our way of proceeding, planning and developing functional components.

A specialised and experienced **customer service**, ranging from application support to the design phase, as well as training courses and assistance throughout the national territory and beyond.

Straight to the heart of Prima Additive

With Prima Additive you make your business future-ready in few steps. Always next to the customer, our engineers will guide you through a concrete approach to improve your production process.

We provide a **support service dedicated to the customer** at every stage of system supply: from choosing the machines, based on the industrial sector, up to reaching the maximum manufacturing capacity.



Application support

Helping you identify how to rapidly deploy the Additive Manufacturing process to your business in the most competitive way possible



Design support

Supporting you in design for additive, we can design and build your prototype in our application centre



Field service

Both preventive maintenance and high-quality corrective maintenance to guarantee fast recovery when there is a problem. With more than 13,000 machines installed in more than 80 countries, we are able to give you the required assistance in your language



Remote care

Remote diagnostic and assistance. Skilled service engineers are available to operate remotely with your machines in real time



Training

Training programs and updates for using our machines and software to their best, maximising manufacturing capacity and quality

Wide range of training and consultation services

Our group of specialized engineers is always next to you. You have a unique opportunity to see first hand the capabilities of the technology and we can together identify how to rapidly deploy it in your business in the most competitive manner.

By choosing Prima Additive you take one more step towards the new frontier of manufacturing. We can offer training programs and updates for using our machines and software to their best, maximising manufacturing capacity and quality.

1

Pre-sales

- Demo activities in our Application Center
- Overview of the additive process through a real typical layout
- Application study of customer real case with possibility to prototype a real parts

2

Installation and operation

OPERATOR TRAINING

- Basic training on main functions of machine (control software operation, set up, safety)
- Training on peripheral equipment (dry oven, sieve etc)
- Practice on pre-selected parts to check main issues, alarms and operation details

APPLICATION TRAINING

- Use of Materialise Magics and EP Hatch software
- How to prepare a job file and set parameters
- How to support
- Set up machine and print specific parts with errors
- Rules of thumb for orientation and design for printing according to the used material

3

After-sales

- Application support
- Consultation
- Worldwide Service

ADVANCED TRAINING

- Training on how manage process parameters on EP Hatch software
- Process parameters adjustment and process optimization
- Powder and part characterization

The variety of Prima Additive materials for Powder Bed Technology

Discover the list of materials available for your selective metal additive manufacturing. **Prima Additive offers a comprehensive selection of metal powders** ranging from aluminum through to nickel, steel, titanium as well as copper chrome alloys. In this way materials, machines and manufacturing parameters are harmonized for excellent results.

Aluminum Alloys

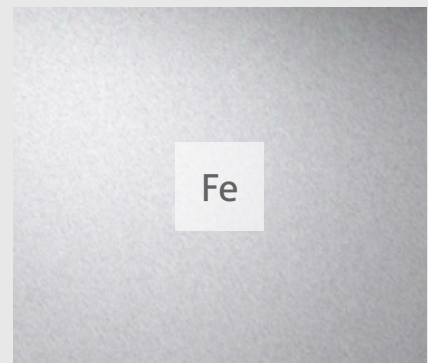
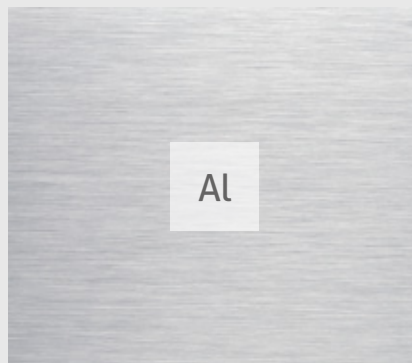
Steel Alloys

Prima Additive are constantly striving to improve materials technology, machines and processes to support you to qualify your powder. We develop the correct process parameters and set an optimal configuration for your machine to ensure quality and repeatability.

TYPE

DESCRIPTION

APPLICATION SECTORS



AlSi10Mg

High thermal conductivity, high mechanical properties (strength and hardness), high electrical conductivity, good post process finishing, excellent corrosion resistance and low density

Aerospace
Automotive
Mechanical components

316L, Maraging M300, 17-4PH

Excellent strength under elevated temperature combined with high corrosion resistance, hardness as well as high ductility, high post process finishing and good thermal properties

Oil and Gas
Food Industries
Aerospace
Automotive
Biomedical
Chemical
Mechanical components

Do you need to realize parts in a different material?

We are open to investigate and produce new materials suitable for additive in order to accommodate your specific needs. We will evaluate your business case, developing with you the best material for your application.

Titanium Alloys



Ti-6Al-4V

Low specific weight combined with low thermal conductivity and expansion, excellent mechanical properties, high biocompatibility and high corrosion resistance

Aerospace
Automotive
Biomedical

Nickel Alloys

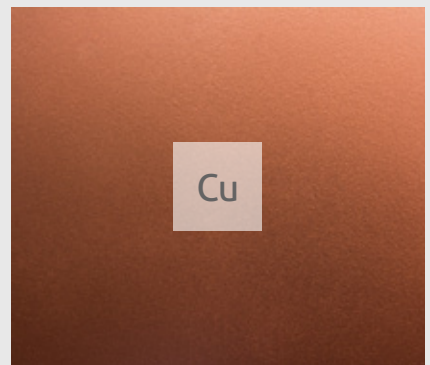


In625, In718

High yield, fatigue and creep strength with excellent anti-oxidation and anti-corrosion behavior in aggressive environments, high corrosion resistance at high temperatures high strength and good ductility

Aerospace
Automotive
Biomedical
Chemical
Energy
Oil and Gas
Mechanical component
Marine

Copper Alloys



CuSn10

High resistance against corrosion combined with mechanical properties and both thermal and electrical conductivity

Electronics
Aerospace
Jewelry

Aluminum Alloys

AlSi10Mg

MATERIAL PROPERTIES	APPLICATIONS
Low density (high ratio mass/strength)	Automotive
High thermal conductivity	Electronics
Good post process finishing	Cooling device, heat exchangers
High electrical conductivity	Aerospace and defense
High specific strength	

Chemical Composition (wt-%)

Al	Si	Fe	Cu	Mn	Mg	Ni	Zn	Pb	Sn	Ti
Balac.	9.0 - 11	≤ 0.55	≤ 0.05	≤ 0.45	0.2-0.45	≤ 0.05	≤ 0.10	≤ 0.05	≤ 0.05	≤ 0.15

MECHANICAL DATA	UNIT	AS-BUILT
Particles Size Distribution	μm	20-63
Density	g/cm ³	2.65
Part Accuracy	mm	≤0.1 big dimension ≤0.05 small dimension
Thinnest wall	mm	0.3-0.4
Layer thickness	μm	30
Roughness	R _a (μm)	As-built: 6-10 After shot blasting: 7-10
Tensile strength	R ^m (MPa)	460±20 (XY) / 460±20 (Z)
Yield strength	R ^{p0.2} (Mpa)	270±20 (XY) / 270±20 (Z)
Young modulus	E (GPa)	75±10 (XY) / 70±10 (Z)
Elongation at break	A (%)	8±2
Hardness	HRB	55±5

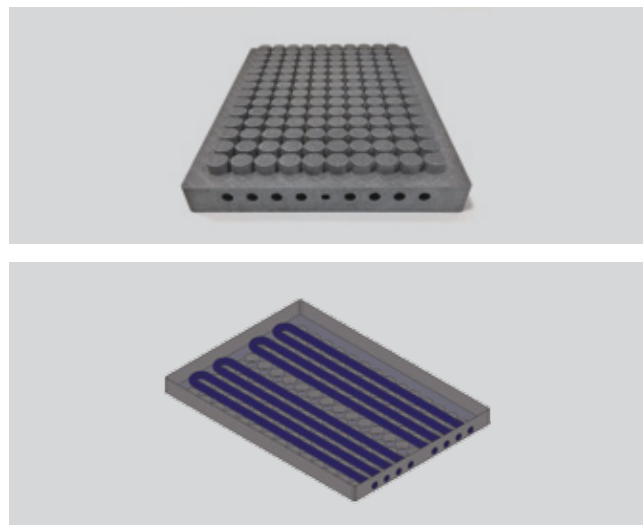
Aluminum Applications

Small lots - Complex parts	
SECTOR	AEROSPACE
INTENDED USE	ENGINE TANK
TECHNICAL DETAILS	<p>Build time*: 28 hours for 1 unit Up to 36 hours for 2 units</p> <p>Layer thickness: 30 μm Time reduction of 40% with 60 μm</p> <p>Material: AlSi10Mg</p> <p>Part Dimension (X-Y-Z): 107 x 153 x 155 mm*</p>

Small lots - Internal Channels	
SECTOR	ELECTRONICS
INTENDED USE	COOLING/HEATING DEVICE
TECHNICAL DETAILS	<p>Build time*: 20 hours 1 part</p> <p>Layer thickness: 30 μm</p> <p>Material: AlSi10Mg</p> <p>Part Dimension (X-Y-Z): 142 x 102 x 15 mm Internal Channels Diameters: 0.8-1.5 mm</p>



Engine Tank (Small lots - Complex parts)



Cooling/Heating device (Small lots - Internal Channels)

*Build Speed is depending on the application. It is influenced by many factors and it is not related only to the part volume.

Steel Alloys

AISI316L

MATERIAL PROPERTIES	APPLICATIONS
High corrosion resistance	Oil and Gas
High hardness	Food industries
High ductility	Automotive
High post process finishing	Aerospace
High strength under elevated temperature	Moulds
	Surgical tools

Chemical Composition (wt-%)

Fe	Cr	Ni	Mo	Mn	Si	P	S	C	N	O
Balac.	16-18	10-14	2-3	2	1	0.045	0.03	0.03	0.1	0.1

MECHANICAL DATA	UNIT	AS-BUILT
Particles Size Distribution	μm	10-45
Density	g/cm^3	7.9
Part Accuracy	mm	≤ 0.1 big dimension ≤ 0.05 small dimension
Thinnest wall	mm	0.1
Layer thickness	μm	30
Roughness	R_a (μm)	As-built: 11 ± 5 After shot blasting: 5 ± 2
Tensile strength	R^m (MPa)	720 ± 40 (XY) / 690 ± 30 (Z)
Yield strength	$R^{p0.2}$ (Mpa)	670 ± 30 (XY) / 630 ± 50 (Z)
Young modulus	E (GPa)	185 (XY) / 180 (Z)
Elongation at break	A (%)	30 ± 5
Hardness	HRB	87 ± 3

Maraging M300

MATERIAL PROPERTIES	APPLICATIONS
High strength	Moulds
High hardness	High Structural Strength Components
High fatigue strength	Tools
High post process finishing	

Chemical Composition (wt-%)

Fe	Ni	Co	Mo	Ti	Al	Cr,Cu	C	Mn, Si	P	S
Balac.	17-19	8.5-9.5	4.5-5-2	0.6-0.8	0.05-0.15	≤ 0.05	≤ 0.03	≤ 0.1	≤ 0.01	≤ 0.01

MECHANICAL DATA	UNIT	AS-BUILT
Particles Size Distribution	µm	10-45
Density	g/cm ³	8.1
Part Accuracy	mm	≤0.1 big dimension ≤0.05 small dimension
Thinnest wall	mm	0.2
Layer thickness	µm	40
Roughness	R _a (µm)	As-built: 15 After shot blasting: 4-6
Tensile strength	R ^m (MPa)	1100±100 (XY) / 1100±100 (Z)
Yield strength	R ^{p0.2} (Mpa)	1050±50 (XY) / 1000±50 (Z)
Young modulus	E (GPa)	185 (XY) / 180 (Z)
Elongation at break	A (%)	12±3
Hardness	HRC	35±2

Steel Alloys

17-4PH

MATERIAL PROPERTIES	APPLICATIONS
Precipitation-hardening steel	Chemical
High tensile strength	Medical
Moderate corrosion resistance	Aerospace

Chemical Composition (wt-%)

Fe	Cr	Ni	Cu	Mn	Si	Nb + Ta	C	N	O	P	S
Balac.	15-17.5	3-5	3-5	1	1	0.15-0.45	0.07	0.1	0.1	0.04	0.03

MECHANICAL DATA	UNIT	AS-BUILT
Particles Size Distribution	μm	10-45
Density	g/cm^3	7.8
Part Accuracy	mm	≤ 0.1 big dimension ≤ 0.05 small dimension
Thinnest wall	mm	0.3-0.4
Layer thickness	μm	40
Roughness	R_a (μm)	As-built: 11-13 After shot blasting: 4-6
Tensile strength	R^m (MPa)	960 \pm 30 (XY) / 860 \pm 30 (Z)
Yield strength	$R^{p0.2}$ (Mpa)	910 \pm 30 (XY) / 830 \pm 30 (Z)
Young modulus	E (GPa)	150
Elongation at break	A (%)	21 \pm 3
Hardness	HRC	35 \pm 3

Steel Applications

Complex parts - Rapid Prototyping	
SECTOR	AUTOMOTIVE
INTENDED USE	EXHAUST MANIFOLDS
TECHNICAL DETAILS	<p>Build time*: 60 hours for 3 units Up to 120 hours for 9 units</p> <p>Layer thickness: 30 µm</p> <p>Material: AISI316L</p> <p>Part Dimension (X-Y-Z): 51 x 110 x 226 mm</p>



Rapid Tools	
SECTOR	TOOLS
INTENDED USE	TOOLS
TECHNICAL DETAILS	<p>Build time*: 5 hours for 1 unit Up to 30 minutes for multiple units</p> <p>Layer thickness: 40 µm</p> <p>Material: Maraging M300</p> <p>Part Dimension (X-Y-Z): 11 x 11 x 50 mm. Top hole diameter: 1.00 mm</p>



Custom Molds	
SECTOR	MOLDS
INTENDED USE	RAPID CUSTOM MANUFACTURING
TECHNICAL DETAILS	<p>Build time*: 4 hours for 1 unit Up to 3 hours for multiple units</p> <p>Layer thickness: 40 µm</p> <p>Material: Maraging M300</p> <p>Part Dimension (X-Y-Z): 45 x 57 x 23 mm</p>



*Build Speed is depending on the application. It is influenced by many factors and it is not related only to the part volume.

Titanium Alloys

Ti6Al4V

MATERIAL PROPERTIES	APPLICATIONS
High Biocompatibility	Medical
Excellent specific strength	Motorsport
High Corrosion resistance	Aerospace
Low thermal conductivity and expansion	High value Sport components

Chemical Composition (wt-%)

Ti	Al	V	C	O	N	Fe	H	Y	Others
Balac.	5.5-6.5	3.5-4.5	0.08	0.13	0.03	0.25	0.015	0.005	0.4

MECHANICAL DATA	UNIT	AS-BUILT
Particles Size Distribution	μm	20-63
Density	g/cm^3	4.4
Part Accuracy	mm	≤ 0.1 big dimension ≤ 0.05 small dimension
Thinnest wall	mm	0.3-0.4
Layer thickness	μm	30
Roughness	R_a (μm)	As-built: 9-12 After shot blasting: 2.8-3.6
Tensile strength	R^m (MPa)	1230 \pm 50 (XY) / 1190 \pm 50 (Z)
Yield strength	$R^{p0.2}$ (Mpa)	1080 \pm 50 (XY) / 1070 \pm 80 (Z)
Young modulus	E (GPa)	110
Elongation at break	A (%)	12 \pm 2
Hardness	HRC	36 \pm 4

Titanium Applications

Medical	
SECTOR	MEDICAL
INTENDED USE	IMPLANTS
TECHNICAL DETAILS	<p>Build time*: 2 hours for 1 unit</p> <p>Layer thickness: 30 μm</p> <p>Material: Ti6Al4V</p> <p>Part Dimension (X-Y-Z): 19 x 54 x 21 mm</p> <p>Tips Diameters: from 2.00 to 0.2 mm</p>

Structural Components - Topology Optimization	
STRUCTURAL	MEDICAL
BRACKET	IMPLANTS
TECHNICAL DETAILS	<p>Build time*: 5 hours for 1 unit Up to 3.5 hours for multiple units</p> <p>Layer thickness: 30 μm</p> <p>Material: Ti6Al4V</p> <p>Part Dimension (X-Y-Z): 80 x 32 x 47 mm</p>



Implants (Medical)



Implants (Structural Components - Topology Optimization)

*Build Speed is depending on the application. It is influenced by many factors and it is not related only to the part volume.

Nickel Alloys

In625

MATERIAL PROPERTIES	APPLICATIONS
High corrosion resistance at high temperatures	Oil and Gas
High creep resistance	Marine
Good Ductility	Aerospace
High strenght	Automotive
	Chemical
	Energy

Chemical Composition (wt-%)

Ni	Cr	Mo	Nb	Fe	Co	Si	Mn	Ti	Al	C	S	P
Balac.	20-23	08-ott	3.15-4.15	5	1	0.5	0.5	0.4	0.4	0.1	0.015	0.015

MECHANICAL DATA	UNIT	AS-BUILT
Particles Size Distribution	µm	10-45
Density	g/cm ³	8.4
Part Accuracy	mm	≤0.1 big dimension ≤0.05 small dimension
Thinnest wall	mm	0.2
Layer thickness	µm	40
Roughness	R _a (µm)	As-built: 10-13 After shot blasting: 2.8-4
Tensile strength	R ^m (MPa)	1080±30 (XY) / 970±30 (Z)
Yield strength	R ^{p0.2} (Mpa)	880±20 (XY) / 790±30 (Z)
Young modulus	E (GPa)	170±20 (XY) / 140±20 (Z)
Elongation at break	A (%)	22±2
Hardness	HRC	32±3

Nickel Applications

Automotive - Rapid Prototyping

SECTOR

AUTOMOTIVE

INTENDED USE

BRAKE CALIPER

TECHNICAL DETAILS

Build time*: 5 hours for 1 unit
Up to 3.5 hours for multiple units

Layer thickness: 40 μm

Material: In625

Part Dimension (X-Y-Z): 8 x 155 x 60 mm



*Build Speed is depending on the application. It is influenced by many factors and it is not related only to the part volume.

Nickel Alloys

In718

MATERIAL PROPERTIES	APPLICATIONS
High corrosion resistance at high temperatures	Oil and Gas
High creep resistance	Turbine Blades
Good Ductility	Aerospace
High strenght up to 700°C	Heat Exchangers
	Energy

Chemical Composition (wt-%)

Ni	Cr	Fe	Ta+Nb	Mo	Ti	Al	Cu	C	Si	Mn	B	Co	P	S
50-55	17-21	Balanc.	4.75-5.5	2.8-3.3	0.65-1.15	0.2-0.8	0.3	0.08	0.35	0.35	0.006	1	0.015	0.015

MECHANICAL DATA	UNIT	AS-BUILT
Particles Size Distribution	µm	10-45
Density	g/cm ³	8.1
Part Accuracy	mm	≤0.1 big dimension ≤0.05 small dimension
Thinnest wall	mm	0.2
Layer thickness	µm	40
Roughness	R _a (µm)	As-built: 10-13 After shot blasting: 2.8-4
Tensile strength	R ^m (MPa)	1060±30 (XY) / 990±30 (Z)
Yield strength	R ^{p0.2} (Mpa)	750±50 (XY) / 720±50 (Z)
Young modulus	E (GPa)	160±20 (XY) / 130±20 (Z)
Elongation at break	A (%)	25±3
Hardness	HRC	27

Nickel Applications

Small lots - Complex parts

SECTOR

AUTOMOTIVE

INTENDED USE

HEAT EXCHANGER

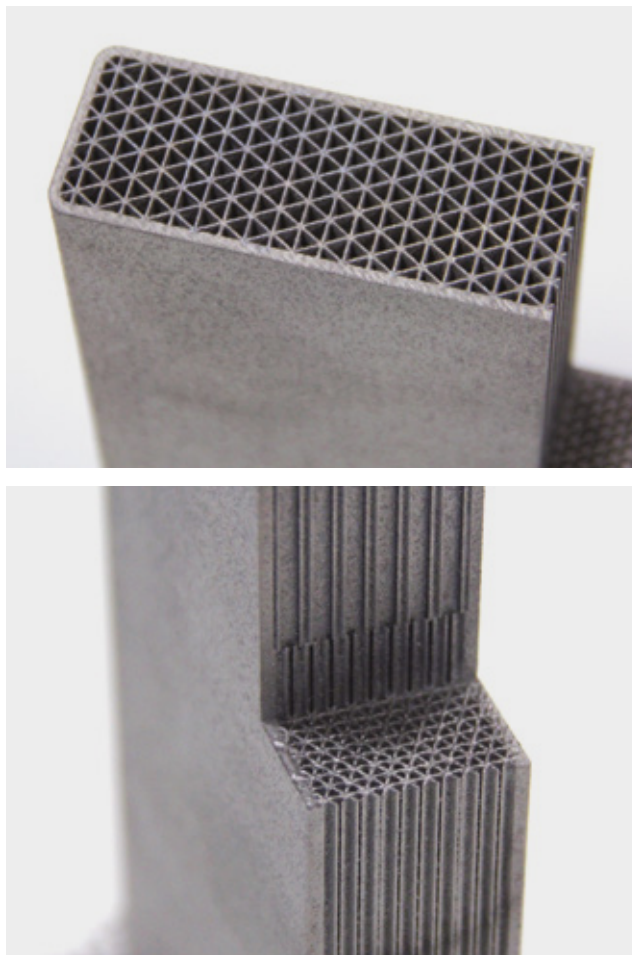
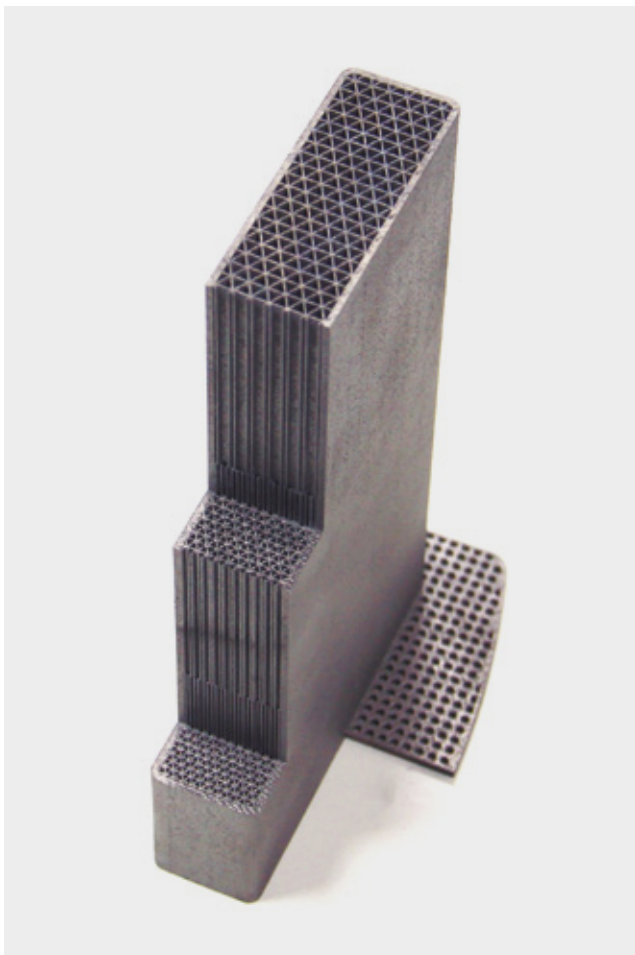
TECHNICAL DETAILS

Build time*: 88 hours for 4 unit
Up to 16 hours/each for multiple units

Layer thickness: 40 μm

Material: In718

Part Dimension (X-Y-Z): 95 x 25 x 154 mm
Internal Wall thickness: 0.12 mm



*Build Speed is depending on the application. It is influenced by many factors and it is not related only to the part volume.

Copper Alloys

CuSn10

MATERIAL PROPERTIES	APPLICATIONS
Good corrosion resistance	Electronics
Good Thermal conductivity	Aerospace
Good Electrical conductivity	Heat Exchanger
Good mechanical property	Jewelry

Chemical Composition (wt-%)

Cu	Sn	Al	Fe	Mn	Ni	P	Pb	S	Sb	Si	Zn
Balac.	10	0.01	0.2	0.1	2	0.2	1	0.05	0.2	0.02	0.5

MECHANICAL DATA	UNIT	AS-BUILT
Particles Size Distribution	μm	10-35
Density	g/cm^3	8.7
Part Accuracy	mm	≤ 0.1 big dimension ≤ 0.05 small dimension
Thinnest wall	mm	0.3-0.4
Layer thickness	μm	30
Roughness	R_a (μm)	As-built: 10 After shot blasting: 4-6
Tensile strength	R^m (MPa)	490 \pm 30 (XY) / 380 \pm 20 (Z)
Yield strength	$R^{p0.2}$ (Mpa)	400 \pm 40 (XY) / 340 \pm 30 (Z)
Young modulus	E (GPa)	115
Elongation at break	A (%)	17 \pm 4
Hardness	HRB	74 \pm 4

Copper Applications

Small lots - Complex parts

SECTOR AUTOMOTIVE

INTENDED USE INDUCTOR

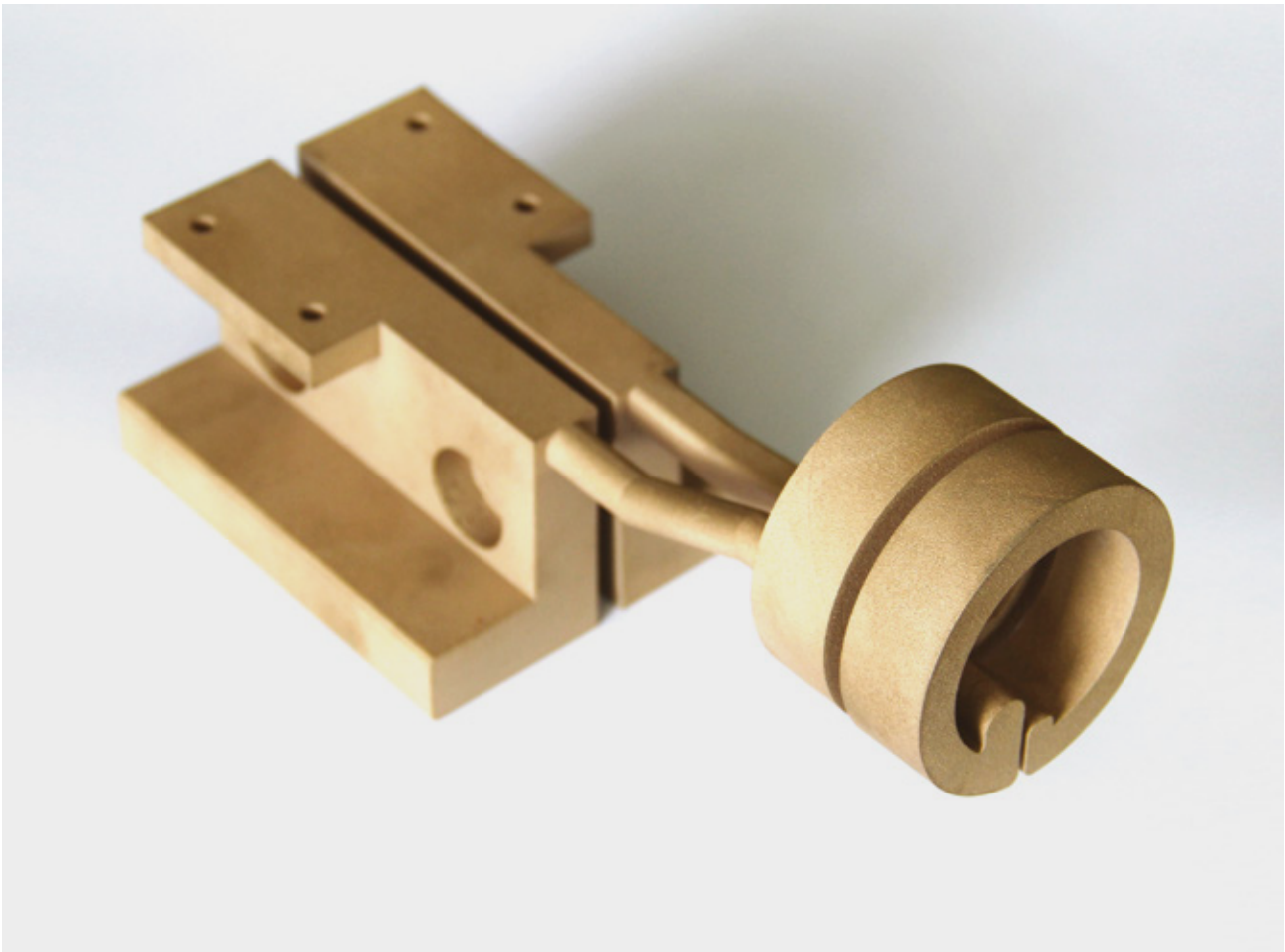
TECHNICAL DETAILS

Build time*: 150 hours for 2 unit

Layer thickness: 30 μm

Material: CuSn10

Part Dimension (X-Y-Z): 210 x 104 x 82 mm
Internal channels of 6 mm



*Build Speed is depending on the application. It is influenced by many factors and it is not related only to the part volume.

Prima Additive at your disposal: application study

Additive is competitive. This is our philosophy, but also our commitment to advancing the industry by reducing the barriers to entry in Additive Manufacturing. We guide and help customers to develop their right additive application. We are open to investigate and produce new materials suitable for additive manufacturing in order to accommodate your specific needs.

Do you want to know if additive manufacturing is the best solution for your business? Contact Prima Additive, we can help you establish materials, machines and production process that most benefits your business.

How to get a free application study?



1. Go to www.primaadditive.com/get-a-free-application-study



2. Upload on our website your 3D model



3. Choose the additive process
(Powder Bed Fusion or Laser Metal Deposition)



4. Choose the material



5. Our expert engineers will analyze your business case and they will send you the full application study tailored to your needs. **For free.**

Contacts

STEP INTO THE NEW FRONTIER OF MANUFACTURING
WITH PRIMA ADDITIVE

Contact us for more details about the Prima Additive product
range and discover how your business could be future-ready as
early as today.

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